REMARKS

The Examiner has rejected Claims 1-33 under 35 U.S.C. §102(a) or (e) as being anticipated by EP 1231121 to Kucera, Weiberle et al. (U.S. Patent No. 6, 256,570), Giers (U.S. Patent No. 6,410,993), EP 0832800 to Kahler et al., Schramm et al. (U.S. Patent No. 5,752,748) or Jordan et al. (U.S. Patent No. 6,540,309). Applicant respectfully asks the Examiner to reconsider this rejection in view of the below Remarks.

Applicant first notes that the Examiner appears to base his rejections entirely upon the fact that the submitted European Search Report lists the six cited references as falling within category X (indicating a belief on the part of the European Examiner that each document is such that when taken alone, a claimed invention cannot be considered novel or cannot be considered to involve an inventive step), as the Examiner has provided no other rationale in stating a prima facie case of anticipation. Applicant respectfully submits that this is improper for a number of important reasons. As is very often the case in general, and as is in fact the case in this specific instance, the claims of the present application as filed are <u>materially and substantially different than</u> the claims upon which the European Search Report was based. Moreover, many of the claims in the present application were amended in the Response to Official Action filed on October 15, 2004 in a way which made them <u>even more different than</u> the claims upon which the European Search Report was based. Therefore, even assuming that the European Examiner was correct in his/her indication that each of the cited references falls within "Category X" with respect to <u>the claims which that European Examiner was considering</u> (a conclusion with which the Applicant does not agree), the European Examiner's findings are completely irrelevant to the claims which are currently pending in the present U.S. application, since the U.S. claims (both those currently pending and those originally filed) are very different from the claims which the European Examiner was considering.

This conclusion is supported by the fact that the cited references uncovered by the European Examiner were not uncovered by the U.S. Examiner of the present application. Applicant believes that this failure by the U.S. Examiner to uncover the cited references in his original independent search was not due to any deficiency in the U.S. Examiner's independent search, but rather was due to the fact that the European Examiner was searching substantially and materially different claims than was the U.S. Examiner. As further discussed below, Applicant respectfully submits that the references cited in the European Search Report have little, if any, relevance to the currently pending claims in the present U.S. application, and certainly none of them anticipates or renders obvious any of the currently pending claims therein.

The present invention is directed to a power supply for a braking system which is particularly adapted to provide system redundancy, while at the same time reducing the likelihood of complete system failure in the case of catastrophic failure (such as caused by an exploding tire, a fire or the like) of one of the system components being powered. This has been a problem with known prior art systems, which generally operate in one of two ways.

In the first type of known prior art system, multiple power supplies are provided, each of which powers some of the brake system components, but not others. Thus, for example, a system may include two power supplies, each powering half of the brake system components. Thus, in the case of failure of one power supply, half of the system components would still be receiving power.

In the second type of known prior art system, multiple power supplies are provided, each of which provides power to all system components on a full time basis (i.e., true redundancy). While this may appear desirable in that should one

of the power supplies fail, all of the system components would be receiving power from the other power supply, in practice, this type of system suffers from at least one significant drawback. Specifically, in the event of a catastrophic failure in one of the system components powered by both power supplies (such as caused by an exploding tire, a fire or the like), both power supply networks may be shorted out, thus causing both power supply networks to fail resulting in a complete loss of power to all system components.

The present invention remedies the deficiencies of both types of prior art systems. In the present invention, first and second power supply networks electrically connect one or more power supplies with first and second brake components, respectively. An auxiliary power supply link is activatable to electrically connect the first brake component and the second brake component only when a failure occurs in one of the first power supply network or the second power supply network, the auxiliary power supply link being adapted to transmit the electrical power between the first brake component and the second brake component when the failure occurs. Such an arrangement provides redundancy in that should the first power supply fail, the first brake component would be provided power through the auxiliary power supply link from the second brake component. Moreover, the system is not prone to complete failure, in that should the first brake component suffer from a catastrophic failure, the first power supply network may be shorted out -- the second power supply network being safe since the first brake component was not directly connected to the second power supply network when it suffered catastrophic failure. Thus, other brake components which have been supplied power by the first power supply network (now shorted out) may be supplied power by the other half of the "pair" to which they belong through auxiliary power supply links, thereby rendering only a single brake component (i.e., the one which suffered from a catastrophic failure anyway) without power.

Claims 1 and 15, the two independent apparatus claims, require, among other elements, (i) an auxiliary power supply link between a pair of brake components, which link is (ii) activatable to electrically connect the pair of brake components only when a failure occurs in one of the power supply networks.

Applicant respectfully submits that none of the cited prior art, either alone or in combination, discloses, teaches or suggests either of the above-highlighted elements.

Kucera discloses a brake system which includes first and second control units and first and second braking units. Each of the first and second control units make a correcting variable available for sending to the first and second braking units in order to control the braking forces in the first and second braking units. The first and second control units each connect to the first and second braking units via separate multi-purpose channels in order for each to transfer a correcting variable. However, Applicant notes that aside from the fact that Kucera is concerned with providing correcting variables, rather than electrical power, this arrangement appears very similar to the second, "true redundancy" type of prior art described above. There are disclosed two control units which are in communication with both braking units at all times. There is no disclosure, teaching or suggestion of an auxiliary power supply link between a pair of brake components, which link is activatable to electrically connect the pair of brake components only when a failure occurs in one of the power supply networks.

Weiberle et al. discloses an electrical braking system for a motor vehicle which includes a pedal unit 10, four wheel units 12, 14, 16 and 18, an energy diagnostic unit 20 and a processing unit 22. Each wheel unit (12, 14, 16, 18) is composed of a wheel module (12a, 14a, 16a, 18a), the wheel sensors (e.g., for example, n1, F1i, s1H, etc.) and an actuator (12b, 14b, 16b, 18b). Each wheel

module (12a, 14a, 16a, 18a) includes a microcomputer system, a monitoring component, and the power electronics for driving the actuator. In one embodiment, actuator (12b, 14b, 16b, 18b) of each wheel includes a resetting (return) device (control via i1R, i2R, i3R, i4R) which, in response to faults that would prevent the brakes of a wheel from releasing, isolates the wheel in question (i.e., releases the brake on that wheel). In order to be able to manage these types of faults even when an energy diagnostic unit (20) is malfunctioning, the resetting device is activated by the adjacent wheel unit of the same axle (e.g. for 12b from 18a). Thus, for example, if there was a communications failure in communications network K1 such that wheel module 12a stopped receiving control signals, a signal would be sent from wheel module 18a via communications link i1R to actuator 12b so as to cause actuator 12b to release.

Applicant respectfully submits that this system is completely different than what is claimed. More specifically, there is no disclosure, teaching or suggestion of an auxiliary power supply link between a pair of brake components, which link is activatable to electrically connect the pair of brake components only when a failure occurs in one of the power supply networks. Weiberle et al. is not at all concerned with supplying power. Moreover, Applicant respectfully submits that the communications links in Weiberle et al. would <u>always electrically connect</u> the two components which they link. In Weiberle et al. there is no selectively activatable link of any kind (whether to transmit control signals or power).

Giers discloses a vehicle control system which comprises two separate control circuits I, II, each having a microprocessor 1, 2 which independently generate control signals (i.e., not power), and an actuator 5, 6. The signal paths or data paths from the microprocessors 1, 2 to the associated actuator 5, 6 of each circuit pass through a commutator 9, 10. The connection between each microprocessor 1, 2 and the associated actuator 5, 6 is closed in an inactive

position of the commutator 9, 10. When an error identification signal FAIL is issued by a failing microprocessor 1, 2, the commutator 9 or 10 is switched over to its second switch position where control of the actuators of the defective circuit I or II is assumed by the intact microprocessor 1 or 2. While this system is different than the typical prior art redundancy type systems described above (in more ways than simply being concerned with transmitting control signals rather than power), it is also disadvantageously different than the system disclosed and claimed in the present application.

One major difference is that the actuators of the failing circuit are provided control signals via the intact <u>microprocessor</u>, not via the paired brake component, as is required by all claims of the present application. This is disadvantageous for several reasons. First, such a configuration is capable of detecting computation failures only in the microprocessors themselves. If a failure occurs "downstream" in one of the communications networks, the microprocessor may not detect that a failure has occurred (because its output signals are still intact), so that the microprocessor would not generate a FAIL signal causing a switching of the commutator. Moreover, if an entire circuit I, II should be shorted out (by a catastrophic failure for example), the microprocessor would likely not be able to generate a FAIL signal causing a switching of the commutator. These disadvantages are not realized with the invention as claimed in the present application, which supplies power <u>from the pair to each brake component not receiving power</u>.

Kahler et al. appears to disclose an electronic brake system for a wheeled vehicle which includes at least two central modules, each of which is in communication with a plurality of wheel modules via two separate databuses. It further appears that the two central databuses may communicate with each other via a connection between the two databuses. However, Applicant notes that aside

from the fact that Kahler et al. is concerned with providing control signals, rather than power, this arrangement appears very similar to the first type of prior art described above. There are disclosed two separate databuses which may be in communication with each other. There is no disclosure, teaching or suggestion of an auxiliary power supply link between a pair of brake components, which link is activatable to electrically connect the pair of brake components only when a failure occurs in one of the power supply networks.

Schramm et al. discloses an electronic brake system having some redundant control aspects thereto. More specifically, the system includes a central module 1 which is in communication via a bus system 3 with brake modules 2a, 2b. If a failure is detected within central module 1, control of certain braking functions can be assumed locally by brake modules 2a, 2b. However, aside from the fact that no mention is made of providing a redundant electrical power supply of any kind, the "redundant" control scheme disclosed in Schramm et al. would do nothing to remedy the known disadvantages of prior art systems -- if a catastrophic failure in the vicinity of one of the brake modules caused the bus system 3 to be shorted, complete system failure would be likely. This is true because Schramm et al. does not disclose, teach or suggest in any way an auxiliary power supply link between a pair of brake components, which link is activatable to electrically connect the pair of brake components only when a failure occurs in one of the power supply networks.

Jordan et al. discloses an electronic braking system 5 for a vehicle which includes a brake pedal 50 arranged to provide an electronic signal in response to operation thereof, and a number of braking nodes coupled to the brake pedal 50, each node being arranged to control a brake actuator 15, 25, 35, 45. Each brake node has a controller 10, 20, 30, 40 arranged for processing the first signal to provide a second signal for controlling the brake actuator, and for providing third

signals for transmission to the other controllers. The third signals are the expected second signal results of the other controllers' calculations. Each controller 10, 20, 30, 40 is arranged to compare the second signal with the third signals received from the other controllers 10, 20, 30, 40 such that errors detected between the second and third signals indicate faults in the controllers 10, 20, 30, 40.

However, it should be noted that no mention is made as to how each of the controllers 10, 20, 30, 40 is powered. It should also be noted that as far as control is concerned, the brake pedal 50 and each of the controllers 10, 20, 30, 40 is connected by two communications buses 7, 8 in a "truly redundant" fashion. As such, the system disclosed in Jordan et al. would suffer from the same disadvantages (e.g., the risk of complete system failure in the event of a catastrophic failure in the vicinity of one of the controllers 10, 20, 30, 40) as described above in connection with prior art systems of this type.

For the foregoing reasons, Applicant respectfully submits that all pending claims, namely Claims 1-33, are patentable over the references of record, and earnestly solicits allowance of the same.

Respectfully submitted,

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Amendments to the Drawings:

No amendments are made to the Drawings herein.